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EXAMINER	
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ART UNIT	PAPER NUMBER
1753	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,923	RUBIN ET AL.	
	Examiner	Art Unit	
	Jeffrey T. Barton	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,8,27-33 and 36-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,8,27-33 and 36-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20070606, 20070606*.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *20070608* .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 30 April 2007 has been entered.

Response to Amendment

2. The amendment filed on 30 April 2007 does not place the application in condition for allowance.

Status of Objections and Rejections Pending Since the Office Action of 1 February 2007

3. The objection to claim 1 is withdrawn due to Applicant's amendment.

4. The rejection of claims 2-5, 8, and 29-31 under 35 U.S.C. §112, first paragraph due to lack of support for the limitations recited in claim 2 is withdrawn due to Applicant's amendment. Page 10, lines 26-29 provides support for coated wires that are not soldered to the terminal bar until the electrode is heated and pressed onto the solar cell and bar. This is considered to support the broadened language that is open to wires that are not yet connected to the terminal bar.

5. The rejection of claims 28 and 29 under 35 U.S.C. §112, first paragraph due to lack of support for the limitations recited in claims 28 and 29 are withdrawn.

6. The rejection of claim 36 under 35 U.S.C. §112, first paragraph due to lack of support for the limitations recited in claim 36 is withdrawn due to Applicant's clear statement on the record of what is meant by "to be drawn". The specification clearly states that the film is lead by the drum 12 over the surface of a rotatable roller 13 and is pulled by a drum 15 (Specification Page 7, lines 33-34), and this supports the limitation if "drawn" is read as being synonymous with "pulled".

7. All other rejections are maintained.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1-5, 8, 27-33, and 36-39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Independent claims 1 and 39 recite, "a coating comprising an alloy having a low melting point", which lacks support in the original disclosure. All relevant portions of the specification and original claim 1 recite "a coating *consisting of* an alloy with a low

melting point" (italics added), and there is no support in the specification for other components of the coating, to which the new "comprising" language is open. The same grounds apply to claims 2-5, 8, 27-33, and 36-38.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 33 recites "a first terminal bar", although "a first terminal bar" was recited in claim 1. It is unclear whether this must be the same terminal bar.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. In the rejections that follow, undue weight is not given to the recitations, "to solder said wires to said electrically conductive surface and to a first terminal bar" in lines 12-14 of claim 1 or "to provide for soldering of said wires to said electrically conductive surface" in lines 11-12 of claim 39, because such limitations correspond to intended use of the recited structure. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

16. Claims 1-5, 27-33, 36, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Little in view of Shiotsuka et al. (EP 0 807 980 A2)

Little discloses an electrode in a photovoltaic element (Figures) comprising an electrically insulating optically transparent film (34), an adhesive layer (AR coating on surface 32; Column 7, lines 6-32) provided on a surface of the film, a first plurality of parallel electrically conductive wires (24) embedded in the adhesive layer (Column 7, line 6 - Column 8, line 25), wherein the adhesive layer secures the wires to the film, a part of the surfaces of these wires protruding from the adhesive layer (Figures 9 and 10 - necessary for contact to the cell), wherein the wires are connected to a first terminal bar. (Figures 4 and 5, interconnect 70; Column 9, line 53 - Column 10, line 30; wires are connected through buses 28)

There is no structure recited to distinguish the claimed "film" from the plate 34 of Little - a thick "film" reads on a "plate", and a thin "plate" reads on a "film", particularly when using the plastic plate taught by Little. (Column 6, line 68 - Column 7, line 5) Additionally, within the interpretation of the Examiner, the wires of Little are embedded in the softened antireflective coating on the interior face of plate 34 - this layer is adhesive (Note particularly Column 8, lines 21-25). Because wires 24 only contact plate 34 through AR layer 32, and the wires are clearly secured to the plate, film 32 can be said to secure the wires to the plate.

Relevant to claim 2, Little also discloses a second plurality of wires (28) running parallel to each other and disposed between the transparent film (34) and wires (24) of the first plurality, causing the wires 24 to read on the claimed "outer wires". (Figure 11;

Column 10, lines 39-62) Wires 28 and 24 form a mesh, and wires of the second plurality are connected to another terminal bar (70). (Column 10, lines 27-30 - each bus is provided with an interconnect structure)

Relevant to claim 3, the terminal bars (70) that are connected to parallel bus bars 28 in Little et al are electrically connected to each other through wires 24.

Relevant to claim 4, the terminal bars are connected to the respective ends of each bus bar 28. (Column 10, lines 2-30; Figures 4 and 5)

Relevant to claim 5, in the embodiments with multiple bus bars 28 (e.g. Figure 1), the interconnects 70 connected to the outermost bus bars 28 can be described as being provided at opposite ends of the wires 24. Interconnects 70 are clearly provided "outside a contour" of the photovoltaic element.

Relevant to claim 27, the wires 24 extend along a longitudinal axis of the film. (Figure 11)

Relevant to claim 28, the wires 28 (Figures 9 and 11) extend perpendicular to a longitudinal axis of the film.

Relevant to claim 29, the wires 24 read on the "outer wires", and extend as claimed. (Figure 11)

Relevant to claim 31, all wires 24 and 28 are shown as having portions embedded in the adhesive layer. (Figure 9)

Relevant to claim 36, the plates 34 of Little are drawn along conveyor 88 (Figure 11) and are disclosed throughout the specification and figures as having sufficient

strength to support the AR film. A plastic plate as disclosed by Little (Column 6, line 68 - Column 7, line 5) is considered to inherently meet the elasticity limitation.

Little does not explicitly disclose a low melting alloy coating provided on the surface of the first plurality of wires. Little is also silent concerning the thickness of the AR layer (Claim 32), does not teach a plate/film thickness of 20-50 micrometers (Claim 37), and is silent concerning the specific orientation of the interconnections 70, which correspond to the instantly claimed terminal bar. (Claim 33)

Shiotsuka et al teach that it is conventional in the photovoltaic art to connect electrodes to bus bars using solder. (Page 2, lines 28-33)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the electrode of Little by connecting wires 24 to busbars 28 using solder, as taught by Shiotsuka et al, because it would have provided a simple means of securing solid electrical connection and maintaining the desired spatial relationship of the wires and buses. Since conventional solders comprise low-melting alloys, such as Pb/Sn, such modification meets the limitations of the claims. This combination meets the limitations of claim 30, as well.

Regarding claim 32, Little discloses using wires of 1.6 mil diameter (Column 12, lines 51-53), which corresponds to about 41 microns. This is much thicker than typical antireflective coatings used in the art, which are on the order of a few microns or less in thickness. The position that the wires are thicker than the antireflective layer is

supported by the teaching of Little at Column 8, lines 4-17, which describes deformation of the plate that underlies the AR coating upon pressing of the wires into the surface. The deformation would have been primarily in the AR coating if it were thicker than the wires. Furthermore, such deformation of a thicker ceramic antireflective coating (Column 7, lines 19-23) would have required higher temperatures, since these materials will not soften at 700 °C. Therefore, the Examiner's position is that the AR coating of Little is thinner than the 41-micron thick wires disclosed.

Regarding claim 33, the arrangement of solar cells in a module shown by Little et al (Figure 4) involves positioning cells in a rectangular array, with interconnections running between adjacent cells. It would have been obvious to one having ordinary skill in the art to specifically orient these interconnections along the intercell pathways defined in a rectangular grid (e.g. spaces between the cells in figure 4), depending on whether cells in a row or column are desired to be connected in series or parallel. For instance, with the cell arrangement shown in figure 4, if a skilled artisan having a high-current application desired to connect cells in parallel, it would have been obvious to run a connector 70 between wires 28 of adjacent cells along the space between cell rows. Such a connection would be transverse to wires 28, and meet the limitations of the claims.

Regarding claim 37, in *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed

relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. The choice of thickness of the film would not significantly alter the performance of the claimed electrode.

17. Claims 1-4, 27-29, 31, 33, and 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nath et al in view of Ichinose et al.

Relevant to claims 1 and 39, Nath et al disclose an electrode in a photovoltaic element (Figures) comprising an electrically insulating optically transparent film (e.g. Figure 1C, layers 25a, 25c, 25e, or 25g), an adhesive layer (Thermoplastic; Column 5, line 62 - Column 6, line 19) provided on a surface of the film, a first plurality of parallel electrically conductive wires (24) embedded in the adhesive layer and not embedded in the film (Figures 1A-1D; Column 5, lines 8-20; after the lamination process described at Column 7, lines 6-27, the adhesive 25b surrounds glass fiber 25a, and wires 24 will be embedded therein), wherein the adhesive layer secures the wires to said film (Column 5, line 37 - Column 6, line 32), a part of the surfaces of these wires protruding from the adhesive layer (Inherently necessary for contact to the cell), wherein the wires are connected to a first terminal bar. (e.g. busbars 27 at either end of the cell shown in Figure 1B read on "terminal bars")

Relevant to claim 2, Nath et al also disclose a second plurality of wires (Internal busbars 27) running parallel to each other and disposed between the transparent film (34) and wires (24) of the first plurality. (Column 5, lines 8-16; in the embodiment where wires are used, one of the other of wires 24 and 27 must be disposed between the film

and the other wire - either would be obvious to place in this position) Wires 27 and 24 form a mesh (Figure 1B), and wires of the second plurality are in contact another terminal bar. (e.g. busbars 27 at either end of the cell shown in Figure 1B read on "terminal bars", and are connected to the other busbars 27 through wires 24) As the busbars 27 at either end of the cell of Figure 1B and wires 24 are in contact with each other, they are considered to be "operably configured for soldering" to each other.

Relevant to claim 3, all wires/terminal bars shown in Figure 1B are electrically connected to each other.

Relevant to claim 4, the terminal bars are connected to the respective ends of each bus bar 28. (Column 10, lines 2-30; Figures 4 and 5)

Relevant to claims 27-29, wires within the unit of Nath et al are shown as running parallel and perpendicular to a longitudinal axis of the substrate. (Figure 1B)

Relevant to claim 31, upon lamination, all wires will have portions embedded in the adhesive thermoplastic.

Relevant to claim 33, the busbars 27 at either end of the cell shown in Figure 1B of Nath et al read on such terminal bars.

Relevant to 36, any of fiber layers 25a, c, or e, or protective member 25g is considered to meet these limitations.

Regarding claim 37, layer 25g is disclosed as being a 1.5 mil (25 micrometer) Tefzel sheet.

Nath et al do not explicitly disclose a low melting alloy coating provided on the surface of the first plurality of wires.

Ichinose et al teach coating electrode wires in photovoltaic cells with conductive anti-corrosion films, such as silver-palladium alloy. (Column 9, lines 35-44) Specific to claim 38, this coating is provided on the entire surface of the electrode wires. (Figure 1B)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the electrode of Nath et al by providing it with an anti-corrosion silver-palladium alloy film, as taught by Ichinose et al, because prevention or reduction of corrosion would have been expected to increase the useful lifetime of the cells. Since a silver-palladium alloy has a lower melting point than numerous other materials (e.g. pure palladium), it reads on a broadly recited "alloy with a low melting point" in the absence of a definition of what is considered a low melting point.

Response to Arguments

18. Applicant's arguments filed 30 April 2007 have been fully considered but they are not persuasive.

Supplemental Evidence

In addition to the remarks addressed below, Applicant submits an award presented to Applicant at the 21st European Photovoltaic Solar Energy Conference, purportedly based on the same material that is the subject of the instant application, as evidence of the non-obviousness of the instant claims. While certainly impressive, such a submission cannot be persuasive, since there is nothing to connect the award with the language of the instant claims.

Rejections under 35 U.S.C. §112

Regarding the rejection of claims 1-5, 8, 27-33, and 36-38 under 35 U.S.C. §112, first paragraph, Applicant argues that the original German priority document (DE 102 39 845.3) used language compatible with the new "comprising" language. Applicant is respectfully reminded that mere statements to this effect in the absence of evidence are insufficient to overcome the rejection. It is suggested that Applicant submit a declaration from a person knowledgeable in both the German and English languages in support of this position. Upon submission of such a declaration, the rejection may be withdrawn. However, the Examiner notes that language such as "made from" is believed to correspond more closely to "consisting essentially of", as one would conventionally say that an item is "made from" its principal defining parts, as opposed to minor constituents that have no affect on the properties of the item.

Applicant has made no arguments or amendments addressing the rejection of claim 33 under 35 U.S.C. §112, second paragraph. The rejection is therefore maintained.

Rejections under 35 U.S.C. §103(a)

Regarding the rejection over Little in view of Shiotsuka et al, Applicant argues that Little fails to teach or suggest a film. As pointed out above, there is no structure recited to distinguish the claimed "film" from the plate 34 of Little - a thick "film" reads on

a "plate", and a thin "plate" reads on a "film", particularly when using the plastic plate taught by Little. (Column 6, line 68 - Column 7, line 5)

Applicant additionally argues that layer 32 of Little is not an adhesive layer as claimed. The Examiner must maintain that since layer 32 adheres to plate 34 and to the wires, and since plate 34 only contacts the wires via layer 32, and since the wires are pressed into plate 34 through layer 32, layer 32 reads on an adhesive layer in which the wires are embedded, and which secures the wires to plate 34.

Regarding the rejection over Nath et al in view of Ichinose et al, Applicant argues that Nath et al do not teach a film and adhesive layer as claimed. As pointed out above, layers 25a, c, e, or g corresponds to the claimed film, while layer 25b corresponds to the instant adhesive, which clearly secures the upper film layers to the cell and wires 24 and 27. Applicant also argues that there is no motivation to combine the references. The benefit of reduced corrosion taught by Ichinose et al clearly provide motivation to include the wires having alloy layers taught by Ichinose et al in the structure taught by Nath et al. Applicant's arguments concerning the "low melting point" limitation are not persuasive because the instant disclosure provides no teaching as to what constitutes a "low melting point". Since a silver-palladium alloy has a lower melting point than numerous other materials (e.g. pure palladium), it reads on a broadly recited "alloy with a low melting point" in the absence of a definition of what is considered a low melting point.

Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JTB
8 June 2007

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